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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,104	01/19/2006	Hiroki Maeda	2006_0043A	5520
513 7590 07/17/2008 WENDEROTH, LIND & PONACK, L.L.P. 2033 K STREET N. W. SUITE 800 WASHINGTON, DC 20006-1021				
EXAMINER				
EOFF, ANCA				
ART UNIT		PAPER NUMBER		
1795				
MAIL DATE		DELIVERY MODE		
07/17/2008		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/565,104

**Applicant(s)**

MAEDA ET AL.

**Examiner**

ANCA EOOF

**Art Unit**

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 June 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 9-11 and 13-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 9-11 and 13-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. The certified English translation of the foreign priority document JP 2003-093624 filed on March 26, 2004 was received and acknowledged.
2. Claims 9-11 and 13-18 are pending in the application. Claims 1-8 and 12 are canceled.

### ***Continued Examination Under 37 CFR 1.114***

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 30, 2008 has been entered.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

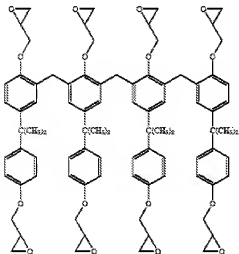
5. Claims 9-10, 13, 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hurditch et al. (US Patent 6,391,523) in view of Ohkawa et al.

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(US Patent 6,368,769) and in further view of Takahashi et al. (US Patent 6,313,188).

With regard to claim 9, Hurditch et al. disclose a composition for negative resist comprising:

a) at least one particular polyfunctional epoxy resin which is capable of undergoing ring-opening polymerization under the influence of a strong acid catalyst (column 4, lines 1-3), such as a glycidyl ether of the novolac condensation product of bisphenol A and formaldehyde of formula (I):

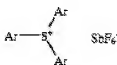


(I), (column 4)

The compound of formula (I) is equivalent to the multi-functional bisphenol A novolak epoxy resin of formula (3) in the instant application, when  $R_1$  to  $R_6$  are  $-\text{CH}_3$  groups and  $n=2$ .

b) at least one photoacid which releases strong acid under the influence of ultraviolet light (column 4, lines 4-5), such as a triarylsulfonium salt of formula (II):

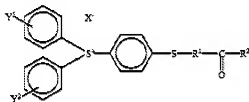
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(II), where Ar represents a mixture of aryl groups (column 4, lines 50-64).

However, Hurditch et al. do not specifically disclose the substituted triarylsulfonium salt of formula (1) of the instant application.

Ohkawa et al. disclose a resin composition comprising a cationically polymerizing organic substance and a photoacid generator (column 4, lines 26-29), wherein the photoacid is a sulfonium salt having the formula (III):



(III) (formula (1) in column 4, lines 1-10), wherein R<sup>1</sup> is a p-phenylene group in which one or more hydrogen atoms are substituted by halogen or alkyl group, R<sup>2</sup> is a hydrocarbon radical, in which oxygen or halogen may be contained, Y<sup>1</sup> and Y<sup>2</sup> are identical or different, respectively hydrogen, halogen or oxygen, or a hydrocarbon radical and X is a monovalent anion (column 4, lines 12-18). A specific example of sulfonium salt of formula (III) is 4-(2-chloro-4-benzoylphenylthio)phenylbis(4-fluorophenyl)sulfonium hexafluoroantimonate (column 6, lines 5-6), which meets the limitation for the sulfonium salt of formula

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(1) of the instant application, wherein  $X_1$  and  $X_2$  are fluorine atoms and Y is a chlorine atom.

Okawa et al. further disclose that the cationically polymerizing organic substance may be a polyglycidyl ether of a polyhydric phenol, such as bisphenol A (column 8, lines 62-64).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the sulfonium salt of Ohkawa et al. for the composition for negative resist of Hurditch et al., since Ohkawa et al. teach the use of the sulfonium salt for cationically polymerizable compositions comprising epoxy resins.

Ohkawa et al. further disclose that the resin composition comprising the cationically polymerizing organic substance and the photoacid generator (column 4, lines 26-29) may further comprise a photosensitizer, such as an anthracene derivative (column 11, line 27).

However, Hurditch and Ohkawa fail to disclose a photosensitizer such as naphthol.

Takahashi et al. disclose a photocatalytic composition comprising a polycyclic aromatic compound and an onium salt such as a triphenylsulphonium salt (abstract), wherein the polycyclic aromatic compound is used as a sensitizer (column 5, lines 8-9). The polycyclic aromatic compound may be a naphthalene derivative, such as 1-naphthol and 2-naphthol or an anthracene derivative (column 5, lines 13-15 and 27).

The photocatalytic composition can be admixed with a cationically polymerizable compound (abstract), such as epoxy compounds (column 6, lines 28-44).

In Table 1 in column 8, lines 5-17, Takahashi et al. shows that a composition using 1-naphthol as sensitizer has both the internal and the external parts cured after a photocuring process and a composition without sensitizer which only has the external parts cured (explanation of symbols is given in column 8, lines 29-33).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use 1-naphthol or 2-naphthol as sensitizer in the composition of Hurditch modified by Ohkawa, as taught by Takahashi et al., because 1-naphthol and 2-naphthol are functionally equivalent to the anthracene sensitizer of Ohkawa et al. (Takahashi et al., column 5, lines 13-15 and 27) and are clearly disclosed by Takahashi et al. as sensitizer for a cationically curable composition comprising epoxy compounds (abstract, column 5, lines 8-16 and 27).

The sensitizer may be used in an amount of 0.1 to 10 parts by weight, more preferable 0.3-5 parts by weight relative to 1 part of the onium salt (acid generator). Sensitizing activity of the composition deteriorates if the amount of sensitizer relative to that of the onium salt is insufficient, while the property of a cured product gets worse if the amount of sensitizer is too much relative to that of an aryl onium salt. (column 6, line 65 - column 7, line 8).

Takahashi et al. further disclose a composition comprising approximately 1 part by weight of sensitizer, based on 100 parts of photocurable composition (column 7, lines 54-56).

With regard to claim 10, Ohkawa et al. disclose 4-(2-chloro-4-benzoylphenylthio)phenylbis(4-fluorophenyl)sulfonium hexafluoroantimonate (column 6, lines 5-6), which is identical to the compound of formula (2) of the instant application.

With regard to claim 13, Hurditch et al. disclose that  $\gamma$ -butyrolactone is selected as solvent for the resins of formula (I), commercially sold as SU-8 epoxy resin, because of its high solvency of the resin and because it is non-flammable (column 2, lines 39-41 and column 9, lines 9-10).

With regard to claim 15, Hurditch et al. disclose a method of forming a pattern having the following steps:

- dissolving the polyfunctional epoxy bis-phenol A novolak resin, the photoacid generator and the other additives in the selected solvent (column 5, lines 19-21) and spin-coating the solution onto a substrate to form a uniform film (column 5, lines 31-32);

- performing a baking step to evaporate the solvent (column 5, lines 47-48);

- photoimaging the solid photoresist coating using an exposure tool (column 5, lines 50-51);

- developing the coating in an organic solvent developer in order to dissolve away the unpolymerized regions (column 5, lines 60-62);



- performing a post-bake step of the resulting image to fully harden the material (column 5, lines 66-67).

With regard to claim 17, Hurditch et al. further disclose that the content of resin of formula (I) is about 90 mass % based on the total solid content of the photosensitive composition (comparative example 2, column 8).

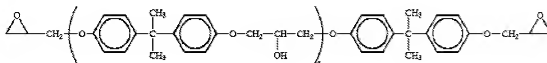
6. Claims 11 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hurditch et al. (US Patent 6,391,523) in view of Ohkawa et al. (US Patent 6,368,769) and Takahashi et al. (US Patent 6,313,188) as applied to claim 9 above and in further view of Williamson et al. (WO 03/018663).

With regard to claim 11, Hurditch modified by Ohkawa and Takahashi disclose the composition of claim 9 above (see paragraph 5 of the Office Action) but fail to disclose a linear polymeric 2-functional epoxy resin.

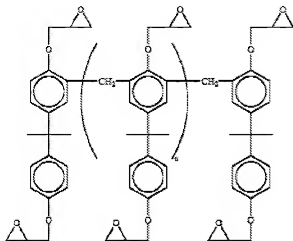
Williamson et al. disclose a composition with applications as coatings and photoresists, said composition comprising a cationic initiator system (abstract).

The initiator may be a sulfonium salt, such as a diphenyl phenylthiophenyl sulfonium salt (page 13, line 5).

Among the polymerizable materials used for the composition, Williamson et al. disclose diglycidyl ethers of bisphenol A, bisphenol A epoxy novolacs and mixtures thereof (page 17, lines 10-15), wherein the diglycidyl ethers of bisphenol A is represented by the formula (IV):



(IV) (page 19, lines 9-10) and the bisphenol A epoxy novolac is represented by the formula (V):



(V) (page 20, lines 4-5).

The photoinitiator (diphenyl phenylthiophenyl sulfonium salt) and the bisphenol A epoxy novolac resin of Williamson et al. are equivalent to the components of the composition of Hurditch modified by Ohkawa and Takahashi.

Based on Williamson's teachings that the diglycidyl ethers of bisphenol A may be used in combination with a bisphenol A epoxy novolac resin in a photoresist composition, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the diglycidyl ethers of bisphenol A in the composition of modified Hurditch, with a reasonable expectation of success.

The diglycidyl ethers of bisphenol A represented by the formula (IV) are equivalent to the compound of claim 18 of the instant application.

7. Claims 14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hurditch et al. (US Patent 6,391,523) in view of Ohkawa et al.

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(US Patent 6,368,769) and Takahashi et al. (US Patent 6,313,188) as applied to claim 9 above and in further view of Zweifel et al. (US Patent 4,624,912).

With regard to claim 14, Hurditch modified by Ohkawa and Takahashi disclose the composition of claim 9 above (see paragraph 5 of the Office Action) but fail to disclose a laminate comprising said composition.

Zweifel et al. disclose that solid epoxy resin comprising a radiation-sensitive photoinitiator are suitable as photosensitive layers which can be transferred easily from a support to a substrate (column 1, lines 56-60). The epoxy resins can be glycidyl ethers of novolaks of substituted or unsubstituted phenols (column 2, lines 10-11), the photoinitiators may be cationic compounds, such as aromatic onium salts (column 3, line 57-column 4, line 9) and a sensitizer, such as 2-naphthol (column 8, line 49) may be added.

Based on the fact that the composition of Hurditch modified by Ohkawa and Takahashi and the composition of Zweifel et al. are equivalent, it would have been obvious to use the composition comprising a multi-functional bisphenol A novolak epoxy resin, a sulfonium photoinitiator and a sensitizer of Hurditch modified by Ohkawa and Takahashi for the photosensitive layer of Zweifel et al.

Zweifel et al. further disclose that the composition is applied to a support (column 9, line 27) and the photosensitive layer present on the support may be protected by a covering film (column 9, lines 40-41), equivalent to the protective film of the instant application.

With regard to claim 16, Zweifel et al. further disclose that the radiation sensitive layer is transferred from the support to the substrate after removal of

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the covering film (column 9, lines 55-57) and it is modified by irradiation (column 9, lines 63-64). Developing is then performed with organic solvents in which the epoxy resin is soluble (column 10, lines 30-31).

### ***Response to Arguments***

8. Applicant's arguments with respect to claims 9-11 and 13-18, filed on June 30, 2008 have been considered but are moot in view of the new grounds of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANCA EOFF whose telephone number is (571)272-9810. The examiner can normally be reached on Monday-Friday, 6:30 AM-4:00 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia H. Kelly can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair->

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/A. E./

Examiner, Art Unit 1795

/Cynthia H Kelly/

Supervisory Patent Examiner, Art Unit 1795